

PAINT FOR STRUCTURAL STEEL FIELD SECTION 1045

1045.1 SCOPE. To establish procedures for inspecting, sampling, and reporting paint and paint constituents to be used for covering structural steel and wood.

1045.2 APPARATUS. All sample containers and equipment used in sampling paint and paint constituents shall be clean and free of all contaminants. The apparatus required shall consist of:

- (a) Appropriate size and type of sample container as given in Table A or Table B of this Section.
- (b) Appropriate thief or sampling device to obtain a representative sample.
- (c) Packaging and labeling materials as described in [General Sec 3.2.2 and 3.3](#) of this Manual.

1045.3 PROCEDURE.

1045.3.1 General. Samples shall be taken by, or under the direct supervision of, the inspector, using all possible caution, skill, and judgment to insure that a representative sample is obtained.

1045.3.1.1 When sampling paint and paint constituents, precautions are to be taken to assure that the samples are not contaminated or altered by any material not representative of the lot being sampled. All sample containers are to be marked with the type of material, lot number, and the inspector's identification number. It is essential that samples of constituents be marked with the chemical names as called for in the given specification. Unless specifically requested, only one random sample need be obtained from each lot, batch, day's pack, or other unit of production. In cases where several small lots are uniformly mixed in a larger mixer or tank, the mixed material shall be considered as one lot.

1045.3.1.2 Whenever possible, samples are to be obtained from original, unopened containers for all types of materials. When constituent containers have no markings distinguishing between units of production, samples are to be taken from different containers or storage units in the ratio of two samples for each 10,000 lb. [4500 kg] or portion thereof and blended in equal quantities to form a composite sample. All constituents for the manufacture of a given mixed paint shall be sampled and submitted to the Laboratory. The manufacturer's proposed formulation of all composition paints should be submitted to the Laboratory. Packaging shall comply with the applicable requirements of Specification Sec 1045.

1045.3.2 Vehicle Constituents. The inspector is to thoroughly mix the contents of the container to be sampled or, in the case of tanks, be assured the material has been thoroughly mixed. The sample container should be filled, leaving approximately one-inch [25 mm] space for expansion. Friction top lids should be secured with clips or other fastening devices before shipment. Shipping regulations are to be observed when preparing samples for shipment.

1045.3.3 Pigments. The package or storage container is to be opened by the inspector and a sample taken at random from the contents.

1045.3.4 Pastes. The inspector is to thoroughly mix the contents with a paddle or spatula and transfer the sample to the sample container.

1045.3.5 Mixed Paints. Sample containers shall be one quart [1L], friction top cans and should be filled, leaving approximately one inch [25 mm] space for expansion. The inspector may mark and submit an original, unopened container of paint to the Central Laboratory in cases where the containers are small such as quarts [liters] or gallons [liters]. When an original container of paint cannot be sent to the Laboratory and there are no facilities for mixing or shaking the material mechanically, the inspector shall insure a representative sample by the following steps:

- (a) Pour off the top liquid into a clean, suitable container having a volume equal to or larger than the one being sampled.
- (b) Stir the settled portion of the paint with a paddle, gradually reincorporating the poured off liquid in small quantities until all has been returned.
- (c) Mix the paint by pouring it back and forth between the two containers several times.
- (d) Obtain a sample promptly.

1045.3.5.1 When samples are taken by the inspector during the filling of containers, a composite sample shall be obtained by combining samples taken at the beginning, middle, and near the end of the operation.

1045.3.5.2 Paint in holding tanks or 55 gallon [208 L] drums should be mechanically mixed to uniformity and sampled promptly.

1045.3.6 Submission of Samples. Paint and some paint constituents require special handling. See [General Secs 3.2.2 and 3.3](#) of this Manual for packaging, labeling, and marking instructions. A Basic Sample Data report shall be entered into SiteManager for each sample of material submitted to the Central Laboratory and shall include all the pertinent information necessary to the sample, such as: kind of paint or constituent, batch or lot number, project number, purchase order or "general construction" for warehouse stock, inspector, source, quantity, intended use, contractor, destination, manufacturer's name and address.

1045.3.7 High Solids Inorganic Zinc Silicate Coating. The applicable requirements of Specification Sec 1045 are to be referred to for requirements pertaining to manufacturer's brand name qualification. The list of paints which are qualified by manufacturer and brand name appears as [FS-1045 Table 6](#) of this manual. Each batch or lot of each component shall be sampled. A sample shall consist of one pint [500 ml] of inorganic silicate vehicle, one pint [500 ml] of metallic zinc powder, and four ounces [120 ml] of activator component. Note that the activator is not to be sampled in metal containers and will be required only when sampling 3-component, high-solids primer. The samples are to be submitted to the Central Laboratory accompanied by a completed Form T-617. In addition to the usual identifying information, Form T-617 should contain the brand name and the net weight [mass] shown on the container of each component.

1045.3.8 Polyurethane System G Final Coating. The applicable requirements of Specification Sec 1045 is to be referred to for requirements pertaining to manufacturer's brand name qualification.. The list of paints which are qualified by manufacturer and brand name

appears as [FS-1045 Table 7](#) of this manual. Each batch or lot of each component shall be sampled. A sample shall consist of each component in the approximate volume proportions recommended by the manufacturer such that the mixed sample will consist of at least one quart [1 L]. The samples are to be submitted to the Central Laboratory through a SiteManager record, including the brand name and the net weight [mass] shown on the container of each component.

1045.3.9 High Solids Epoxy Intermediate Coat. The applicable requirements of Specification Sec 1045 are to be referred to for requirements pertaining to manufacturer's brand name qualification. The list of paints which are qualified by manufacturer and brand name appears as [FS-1045 Table 7](#) of this manual. Each batch or lot of each component shall be sampled. A sample shall consist of one pint [500 ml] of each component. The samples are to be submitted to the Central Laboratory using a SiteManager record including the brand name and the net weight [mass] as shown on the container of each component.

1045.3.10 Waterborne Acrylic System H Intermediate and Finish Coating. The applicable requirements of Specification Sec 1045 are to be referred to for requirements pertaining to manufacturer's brand name qualification. The list of paints which are qualified by manufacturer and brand name appears as [FS-1045 Table 8](#) of this Manual. Each batch or lot of each component shall be sampled. A sample shall consist of one quart [1 L] in a friction top can. The sample is to be submitted to the Central Laboratory through a SiteManager record which includes the brand name.

1045.3.11 Aluminum Epoxy Mastic Primer. When aluminum epoxy mastic primer is permitted in the job special provisions or as shown on the plans, only those brands for which manufacturer and brand name qualification has been given shall be used. Aluminum epoxy mastic primer is not suitable for use against fresh concrete. Brands which have been qualified are listed in [FS-1045 Table 5](#) of this Manual. If a manufacturer desires to have material added to the qualified list, an Independent Testing Laboratory Test Report in triplicate will be required showing specific test results conforming to the requirements of the job special provisions. The report is to be submitted to the State Project Operations Engineer- Materials for approval. The certified test report shall also contain the lot tested, the manufacturer's name, brand name of paint, and date of manufacture. In addition to the Independent Testing Laboratory Test Report, the manufacturer shall also submit a one gallon [4 L] sample for Central Laboratory evaluation which shall be accompanied by a technical data sheet showing the composition of the material and a material safety data sheet. Approval will be based on the Central Laboratory evaluation, independent test results and required information. Each batch or lot submitted for use shall be sampled. The sample is to consist of one pint [500 ml] of each component in friction top cans. The samples are to be submitted to the Central Laboratory and recorded in SiteManager. The record should contain the brand name.

1045.3.12 Gray Epoxy Mastic Primer. When gray epoxy mastic primer is permitted in the job special provisions or as shown on the plans, only those brands for which manufacturer and brand name qualification has been given shall be used. Gray epoxy mastic primer may be used in lieu of aluminum epoxy mastic. Brands which have been qualified are listed in [FS-1045 Table 9](#) of this Manual. If a manufacturer desires to have material added to the qualified list, an Independent Testing Laboratory Test Report in triplicate will be required showing specific test results conforming to the requirements of the job special provisions. The report is to be submitted to the State Project Operations Engineer- Materials for approval. The certified test report shall also contain the lot tested, the manufacturer's name, brand name of paint, and date of manufacture. In addition to the Independent Testing Laboratory Test Report, the



manufacturer shall also submit a one gallon [4 L] sample for Central Laboratory evaluation which shall be accompanied by a technical data sheet showing the composition of the material and a material safety data sheet. Approval will be based on the Central Laboratory evaluation, independent test results and required information. Each batch or lot submitted for use shall be sampled. The sample is to consist of one pint [500 ml] of each component in friction top cans. The samples are to be submitted to the Central Laboratory and recorded in SiteManager including the brand name.

1045.4 SAMPLE RECORD. The Central Laboratory will issue the reports.

1045.5 NON-STANDARD COLORS OF STRUCTURAL STEEL PAINT. The color of structural steel paint shall be gray (Federal Standard # 26373) or brown (Federal Standard # 30045) except when otherwise approved by the District Engineer and the following conditions are met:

1045.5.1 Approved Systems. Only the currently approved systems from currently approved manufacturers will be considered.

1045.5.2 Approval of Colors. When colors other than approved colors are requested, the requester shall include all required data from at least two (2) paint manufacturers as follows:

1045.5.2.1 Manufacturer's Nomenclature. The manufacturer's system nomenclature and code numbers for each coat of the system shall be provided.

1045.5.2.2 Performance Data. Certified performance data shall be submitted to the State Project Operations Engineer - Materials. All testing shall be performed by an independent testing laboratory on samples formulated to the color being requested and applied to properly prepared steel test panels. Performance data submitted shall include the following:

1045.5.2.2.1 Polyurethane Finish Coating. Relative Humidity Resistance Testing per ASTM D1735 or D2247 for 3000 hours, Salt Fog Resistance per ASTM B117 for 3000 hours, and Accelerated Weathering per ASTM G23 Method 1, Type EH (Carbon Arc) for 4000 hours. ASTM G26, Method 2, Xenon Arc or ASTM G53 QUV (Fluorescent UV-Condensation Type using Type A lamps) may be used as an alternate to Carbon Arc.

1045.5.2.2.2 Finish coat is to be applied to properly prepared test panels that have received a prime coat of an approved high-solids inorganic zinc silicate primer and an intermediate coat of approved high solids epoxy. All coats of the system to be tested shall be applied to properly prepared steel test panels. Each coat of the system shall be from the same manufacturer. Test panels for salt fog exposure shall be scribed as described in ASTM D 1654-92 and when rated according to ASTM D 1654-92, each panel must receive a rating of 7 or greater. No panel tested shall exhibit more than slight rusting, undercutting, discoloration, fading, blistering, chalking, loss of gloss, or change in color. All testing shall be performed on duplicate sets of test panels, and upon completion of the prescribed exposure testing, the manufacturer shall submit one set of the exposed panels to the State Project Operations Engineer.

1045.5.2.2.3 Waterborne Acrylic Finish Coating. Relative Humidity Resistance Testing per ASTM D1735 or D2247 for 3000 hours, Salt Fog Resistance per ASTM B117 for 3000 hours, and Accelerated Weathering per ASTM G23 Method 1, Type EH (Carbon Arc) for 4000 hours. ASTM 26, Method 2, Xenon Arc or ASTM G53 QUV (Fluorescent UV-Condensation Type using Type A lamps) may be used as an alternate to carbon arc.

1045.5.2.2.4 Intermediate and finish coats are to be applied to properly prepared test panels that have received a prime coat of high-solids inorganic zinc silicate primer and an intermediate coat of color-contrasting waterborne acrylic coating. All coats of the system to be tested shall be applied to properly prepared steel test panels. Each coat of the system shall be from the same manufacturer. Test panels for salt fog exposure shall be scribed as described in ASTM D 1654-92 and when rated according to ASTM D 1654-92, each panel must receive a rating of 7 or greater. No panel tested shall exhibit more than slight rusting, undercutting, discoloration, fading, blistering, chalking, loss of gloss, or change in color. All testing shall be performed on duplicate sets of test panels, and upon completion of the prescribed exposure testing, the manufacturer shall submit one set of the exposed panels to the State Project Operations Engineer.

1045.5.2.2.5 Field Exposure. The manufacturer of the system shall provide documentation that the system, in the color requested, has performed satisfactorily for 3 years when applied to structural steel under exterior exposure similar to the intended use. The document shall include the location of the structure(s) and the name and telephone number of a contact person for verification of performance.

1045.5.3. Specifications for physical properties. Certified physical property data shall be submitted to the State Project Operations Engineer - Materials. All testing shall be performed by an independent testing laboratory on samples formulated to the color being requested. Physical property data submitted shall include the following:

1045.5.3.1 Polyurethane Finish Coating. The following physical property data shall be provided:

Color, Federal Standard 595b
Weight per Gallon, lbs., minimum [Mass per Liter, kg, min.]
Solids, percent by weight [mass], minimum (ASTM D1644 for 72 hours at 100 F [37.8 C])
Solids, percent by volume, minimum (ASTM D2697)
Pigment, percent by weight [mass], minimum (FEDERAL TEST METHOD 4021)
Vehicle, percent by weight [mass], maximum (FEDERAL TEST METHOD 4021)

(The following physical properties shall be reported and must meet the requirements given.)

Viscosity, 77 F [25 C], KU	65 - 96
Volatile Organic Content, lb/gal, maximum (thinned for application)	3.5 (420)
Fineness of Grind, Hegeman Gage, minimum	6
Sag Resistance, Leneta Anti-Sag Meter, mils [? m] wet, minimum	8 [203]
Pot Life at 77 F [25 C], hrs., minimum	4
Dry to Touch, hrs., maximum	4
Dry to Handle, hrs., maximum	8



1045.5.3.2 Waterborne Acrylic Finish Coating. The following physical property data shall be provided:

Color, Federal Standard 595b
Weight per Gallon, lbs., minimum
[Mass per Liter, kg, min.]
Solids, percent by weight [mass] (ASTM D2369)
Solids, percent by volume, minimum (ASTM D2697)
Pigment, percent by weight [mass], minimum (ASTM D3723)
Vehicle, percent by weight [mass], maximum (ASTM D3723)

(Data for the following physical properties shall meet the requirements given.)

Viscosity, 77 F [25 C] KU	80 - 100
Volatile Organic Content, lb/gal., maximum	3.5 (420)
Fineness of Grind, Hegeman Gage, minimum	7
Sag Resistance, Leneta Anti-Sag Meter, mils [? m] wet, minimum	8 [203]
Dry to Handle, hrs., maximum	2

1045.5.4 Samples. A one (1) gallon [4 L] sample of each coat in the system shall be provided along with complete mixing instructions for each coating. The top coat shall be in the color requested and the intermediate shall be in a contrasting color.

ADDENDUM No. 1 POLICY ON COLOR OF STRUCTURAL STEEL PAINT

The color of structural steel paint shall be gray (Federal Standard #26373) or brown (Federal Standard # 30045) except when approved by the District Engineer and the following conditions are met:

- 1) An agreement with a local entity sponsoring the color is made indicating the local entity shall:
 - a) Pay for all costs associated with providing necessary test data.
 - b) Pay for all costs associated with the finish coat in excess of typical costs associated with standard colors.
 - c) Pay for future costs for applying the finish coat in excess of typical costs associated with standard colors as a condition of continuing the unique color. (The agreement should stipulate that the color will be maintained in the future as mutually agreeable by both parties. The additional cost to the local entity would be determined at that time. Since we require a previously approved "system" be used, the prime coat will be the same as a standard system and should not fail prematurely. If the color fades prematurely and the local entity wants it repainted, they would pay proportionately. If the color fades and the local entity does not want to pay their share, the district would decide when future repainting occurs.)
- 2) Only approved systems from currently approved manufacturers will be considered (List maintained by the Materials Section- Project Operations.
- 3) The district or local entity shall provide certified performance data from an independent testing laboratory on samples formulated with the finish coat of the desired color from two paint manufacturers. Following is the data required:
 - a) Physical property and performance of the finish coat as indicated in the Materials Manual.
 - b) Documentation that the system in the color requested has performed satisfactorily for 3 years under exterior exposure similar to the intended use. The document shall include the location of the structures and a contact person's name and telephone number for verification of performance.
 - c) Duplicate test panels which have undergone accelerated exposure testing for each of the accelerated exposure tests described above, as well as an unexposed control panel shall be submitted to the State Project Operations Engineer - Materials, 1617 Missouri Boulevard, Jefferson City, Missouri 65109.
- 4) All required data as detailed in the Materials Manual shall be submitted to the State Project Operations Engineer - Materials, at least three months prior to the plans due date for letting. Changes after letting shall be submitted to the State Project Operations Engineer - Materials, at least three months prior to date of desired change order.



- 5) Provide a copy of the agreement as listed in Item 1 to State Bridge Engineer, at least three months prior to the plans due date for letting.

(This policy approved 9/10/96 by the Design Committee. See Bridge for the latest version.)